A STUDY OF INTERNATIONAL TRADE NETWORK STRUCTURE OF INDIA WITH SPECIAL REFERENCE TO SERVICE TRADE

A

SYNOPSIS

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I. Introduction

I.I International Trade Network Structure: An Overview

A natural way of representing the trade flow between two countries is by means of a straight-line segment connecting two points representing the trading countries. The segment can be directed, like an arrow, if we knew that the flow originates from one of the two countries and is bound to the second one. We could also attach a value to it indicating the strength of the flow, or we can make the drawing even more complex, including additional information about the countries or the links. If we do the same for all countries in the world, our drawing of international trade flows becomes a graph and, including in the picture all supplementary information about vertices and links, the result would be a network: The World Trade Network (1).

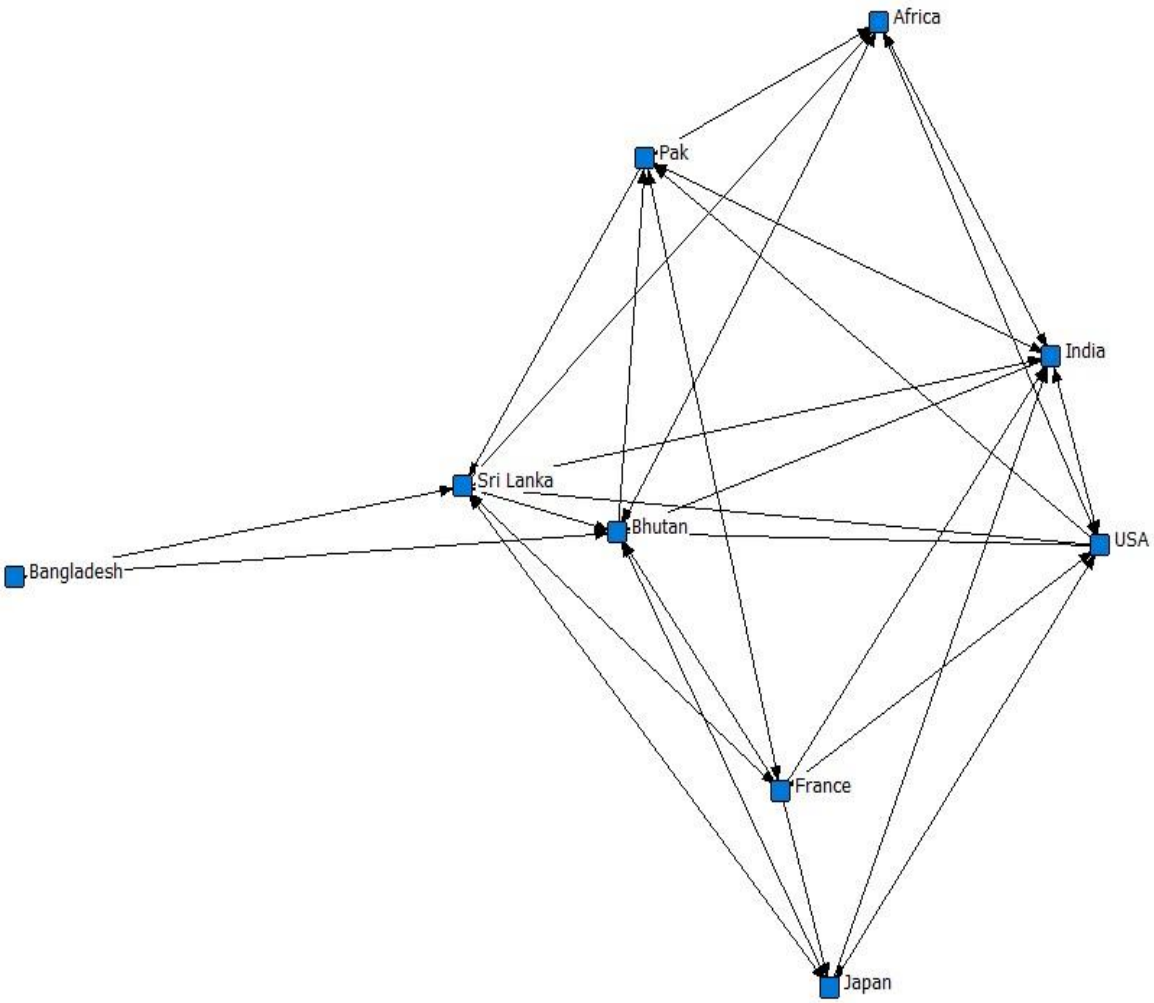

Figure 1: A sample of nine country International Trade hypothetical Network Structure

Initially, Network pattern in world economic trade was analysed through 'Blockmodelling', derived by Lorrain & White in 1971 (2). The analysis included two basic steps-blocking, now called as clustering, of countries on the basis of patterns and describing their aggregate relationship.

In 1979, iconically, Snyder & Kick used a measure to address the issue of how positions are identified for blockmodeling, which was lacking in the former. A measure of the degree of structural equivalence between countries, based on similarity in their volumes of trade on each commodity for the same identical trading partners, was used to address this drawback. However, this first method for determining blocks based on structural equivalence (3) is associated with the CONCOR algorithm (4).

Apart from the historical grounds of Network Analysis (NA) of World trade, which were the foundation bricks of the area, various models have been used to justify the application of NA to cross-border trade. The most popular model associated with NA is 'the Gravity Model'. Various studies of international trade have approached gravity model as the very next method (5-9). The application of NA to international trade can, nicely complement other empirical analyses of trade, in particular the gravity model of international trade (10).

With the exception of typical gravity model, Maluck & Donner(2015) used Multi-regional Input-Output(MRIO) tables to obtain the insights into substructure of International Trade Network. They determined data-driven partitions by utilizing established community detection algorithms(11).

Further, measurement of modularity score to assess the quality of a partition with respect to the notion of a community in a network has been done and they quantified the similarity between two partitions of the same network via the variation of information. With the definition of partitions of the ITN, network measures can be distinguished into internal and cross-subgraph measures. Proper generalizations of standard network measures to interdependent networks have been considered such as node strength, clustering coefficient and betweenness. Similarly, Luca De Benedictis and Lucia Tajoli (2011) used Betweenness centralisation, Indegree & Outdegree closeness centralisation to obtain the application of network structure.

A key takeaway from these studies is that in recent studies World Trade has been analysed through a system of network. This system have been analysed and justified as a theory, namely Trade Network

Theory. Noticeable thing in Network Theory is that Hubler applied components of Electric Circuit Theory in International Economics (12), like Benedictis & Tajoli.

The quantification of Network Structure starts with first degree connectivity. It includes the following indicators:

$d_i^t = \sum a_{ij}^t$

$s_j^t = \sum w_j^t$

(source: Reyes et. al.(2010). Using complex network analysis to assess the evolution of international economic integration: The cases of East Asia and Latin America. *The Journal of International Trade & Economic Development: An International and Comparative Review*)

The above mentioned indicators are Node-degree and Node-strength respectively. These two are first dimension indicators as they only exploit the first-degree connections of a given country.

Other basic topological dimension includes Density and Centrality of the selected node which can be calculated through following formula:

Degree of a node :

$\rho_{auto} = \frac{\sum \rho |E\ \rho\rho'|}{\sum \rho |V\ \rho'|_2}$

(source: Maluck & Donner (2015). A Network of Networks perspective on Global Trade. *PLoS ONE*)

Degree Centrality:

$C_i^d = \frac{d}{n-1}$

(source: Benedicts & Tajoli (2011). The World Trade Network. *The World Economy*)

It is the measurement of the position of every Node in a Network Structure.

The second-degree network measures are the weighted average nearest-neighbor degree (WANND) and the average nearest-neighbor strength (ANNS). The computation of these is as follows:

$ANNS_i = d_i^{-1} \sum_j a_{ij}\ s_j$

$WANND_i = s_i^{-1} \sum_j w_{ij}\ d_j$

(source: source: Reyes et. al.(2010). Using complex network analysis to assess the evolution of international economic integration: The cases of East Asia and Latin America. *The Journal of International Trade & Economic Development: An International and Comparative Review*)

A higher number for both indicators suggests that country *i* is more likely associated with trading partners that themselves are well connected into the World Trade Network, either because of their number of trading partners or for the intensity of their trading relationships.

I.II International Service Trade : overview and concentration

International Trade is the exchange of goods and services between countries (13). The term, 'International Trade' is not only broad but also complex and rigid in nature (14). Apart from the basic difference of intangibility and transitoriness , some static features such as participation rates, firm's characteristics, heterogeneity, concentration and trade variation also draws a thick line between the characteristics of trade in goods and trade in services .Moreover, according to Lennon (2009), bilateral trust and contract enforcement environment, networks, labor market regulations and variables denoting technology of communication have a higher impact on services trade than on goods trade.

Services are often largely overlooked in discussions on global trade, yet they account for the majority of trade in many developed economies and are growing rapidly in many developing economies as well (WTO Report 2019). The share of world services trade by developing economies has grown by more than 10 percentage points since 2005, reaching 29.8 per cent of world services exports and 36.2 per cent of world service imports in 2019 (UNCTAD stats 2019).

India is one of the beneficiaries of the increase in world trade in services. Increase in digitalized economic activities, which is a result of wide-ranging economic reforms in sectors such as finance, Information and Communication Technology (ICT), telecom, Foreign Direct Investment made the connection with the rest of the world stronger. India's share in the world service exports has gone up from 0.97 per cent in 2000 to 3.49 per cent in 2020 due to mostly expansion in software business and financial services (UNCTAD Stats 2020).

The extent of relevance of trade in services is unquestionable as the critical role players in the functioning of the entire economy are infrastructural services such as water and electricity distribution, transport, telecommunications and finance. The growing importance of services shows itself not only

in trade statistics but also in labour market statistics for instance, the ICT sector in India employs around 4 million workers (WTO report 2020).

The deep sea of international trade in services has been differently classified by various researchers (15-17). The most common used classification is provided by Sampson and Snape (1985) and modified by Sapir and Winter (18).

This classification is adopted by World Trade Organisation (WTO) under the General Agreement on Trade in Services (GATS). The classification, which is based on the constraints on the physical location of producer and consumer in realizing the transaction, has ultimately been resulted in four "modes of supply" (17). The four modes are:

Mode 1: Cross Border Supply of Service

A user in country A receives services from abroad through its telecommunications or postal infrastructure. Such supplies may include consultancy or market research reports, tele-medical advice, distance training, or architectural drawings. Professional Services, Computer Related Services, Telecommunication Services, Courier Services and Other Sectors conducive to Consultancy Services fall under the first mode.

Mode 2: Consumption abroad

It implies movement of the consumer to the location of the supplier. For example, movement of tourists, students, or patients to consume the respective services. Tourism is the main sector which falls under this mode.

Mode 3: Commercial Presence

It covers services supplied by a services supplier of one Member by establishing a presence in the foreign market by opening an office in the territory of any other Member. This could be done by a company setting up a subsidiary or branches in another country. For example, the service is provided within country A by a locally-established affiliate, subsidiary, or representative office of a foreign-owned and controlled company, such as a bank, hotel group or construction company. Sectors such as Oil, Gas and Mining Services and Financial Services are important for this mode.

Mode 4: Movement of natural persons

Movement of natural persons covers services supplied by a service supplier of one Member through the presence of natural persons of a member in the territory of any other Member. For example, this is often done through the movement of company staff to other countries. Sectors such as Information Technology, Professional Services and Other services where the movement of service supplying personnel is crucial (i.e. after sales services), are considered important for movement of natural persons.

After the above short description of classification of Trade in Services it is quite important to know that where the world trade services have exactly been concentrated. And also, the concentration of India's service trade.

II. Review of Literature

Network Science has been used to study world trade. Nevertheless, the literature is not that abundant. The most influential research, the researcher is aware of are, Serrano and Boguna (2003), Kali and Reyes (2007), Katelle (2006), Benedictis & Tajoli (2011), Maluck & Donner (2015), Hubler (2015) and Raskovic (2015).

Freddy Cepeda-López, Fredy Gamboa-Estrada, Carlos León and Hernán RincónCastro (2018) used Basic dimensions of connectivity under Network Analysis approach to identify and characterise the connective structure of world trade network (WTN). The paper also focuses on connective and hierarchical features of WTN. They found WTN as dense, reciprocal, compact, clustered, homogeneous by degree and inhomogeneous by strength. Features of WTN do not correspond to a linear aggregation of the features of its constituents.

Zhaohui Chong, Chenglin Qin,and Su Pan (2018) used Descriptive Indices of the Trade Network such as network density, centrality and blockmodeling to describe the structural characteristics of the trade network and compare the evolution of the trade network before and after the proposal of the Belt and Road initiative. They found that China played a central role in the B&R network with the leading rank in almost all centrality indices. Singapore, Russian Federation, Malaysia, and India also took core positions in trade network.

Yener Kandogan(2017) used multiplexity measures of social network analysis to modify several social network analysis measures to get a more accurate picture of the topology of international trade. Kandogan found that All measures, except betweenness centrality, went down when the product-level trade data were analysed, and for the same set of measures, bi-annual analysis increases the resulting figures. Reciprocity, multiplexity and clustering measures were typically higher for small, developed economies.

Nuno Cunha and Rosa Forte(2017) used Major comparative advantage measures such as Balassa Index (BI), Hillman Condition, Symmetrical RCA(SRCA), Additive RCA(ARCA) to reveal Comparative Advantage (CA) in service sector of selected countries. They found that India had a CA in computer and information services, Macao, Thailand and Turkey in travel services, China, Hong Kong, India and Taiwan in other business services, Korea in construction and transport services, and Singapore in financial and transport services.

To examine determinants of India's service exports and to differentiate it from other country-specific and cross-sectional studies. And to analyse role of financial service development, FDI inflows and telecom penetration in the rise of service exports **Pravakar Sahoo and Ranjan Kumar Dash(2016)** used Regression Analysis of Total Service Exports (TSE) function, econometric tools such as Augmented Dickey-Fuller (ADF) unit root test have been adopted. They found that India's aggregate service exports were determined by endowment factors such as human capital, R&D expenditure, physical infrastructure stock and financial sector development along with world demand, real exchange rate and and manufacturing exports.

Luca De Benedictis, Silvia Nenci, and Claudio Vicarelli (2014) used major network analysis measures such as In-degree, out-degree and various centrality measures to define and describe topological features of BACI-CEPII database both in its binary version and in its weighted version. Findings emphasised the importance of US and European countries as players in international trade (degree and strength indices), the centrality of US as a hub in the World Trade Network (closeness, eigenvector), the importance of China as a partner of the major advanced countries.

To empirically examine concentration of service sector growth and to analyse that how much Service-Sector Output just outsourced manufacturing activity, Barry Eichengreen and Poonam Gupta (2011)

used Correlation between Growth in Services sub-sectors and Manufacturing in India and t test has been used and found Sustaining economic growth and raising living standards in India entailed shifting labour out of agriculture into modern services as well as manufacturing and not just

into the latter. To the extent that the expansion of both sectors continued to be constrained by the availability of skilled labour, this simply underscored the importance for India of continuing to invest in labour skills.

Luca De Benedictis, and Lucia Tajoli (2011) used Network Analysis to explore World Trade Network and its changes overtime by using Network Analysis, and to find out the role of WTO in international trade, existence of regional blocks, dimensions of the extensive and intensive margin of trade. They found that Trading system has become more intensely interconnected, while the heterogeneity among countries increased; the average structural network distance has decreased and then increased again, and the position of many countries in the network changed.

Matteo Barigozzi, Giorgio Fagiolo,and Diego Garlaschelli (2010) used Multi-Network Analysis and Correlation between topological properties within different commodities to trace trade architecture of commodity-specific trade networks. To examine selected countries performance in different commodity-specific networks from the point of view of various topological properties. They found that from the point of view of link-weight distribution, commodity specific networks were extremely heterogenous. They also displayed average connectivity, clustering and centrality levels very different from their aggregates. Cross-commodity correlations of the same statistical property found positive. Due to rise in focus of trade specialization, roles played by different commodities in International Trade Network have become more contradicting.

Javier Reyes, Stefano Schiavo and Giorgio Fagiolo (2010) used Complex Network Analysis approach such as first-degree connectivity using node-degree, node-strength, and node-disparity indicators, Clustering and higher-order connectivity measures, random-walk betweenness centrality to investigate the pattern of international integration followed by East Asian countries and compares it with the Latin American performance by using indicators based on network analysis. They found that The position of High Performing Asian Economies (HPAE) countries within the WTN has implications that may affect the functioning of international organizations like the WTO. A rising

pattern of integration can be seen for HPAE. The trend goes consistent with the increase in the total trade-to-GDP ratio – whereas Latin American Economies (LATAM) economies have not improved their position much within the network.

L.G. Burange, Sheetal J. Chaddha, and Poonam Kapoor(2010) used Revealed Comparative Advantage Index to analyse services trade in India, its composition, revealed comparative advantage of various sub-sectors of services and to compare their growth in the pre and post-liberalisation Period. They inferred that Growth in India's services trade has surpassed the growth in world trade in the post-reform period. Along with Other Commercial Services (OCS), India has displayed a comparative Advantage in exports of other business services, construction and insurance services as well.

Stefano Schiavo, Javier Reyes, Giorgio Fagiolo (2009) used Indicators of Network Analysis: Node Degree, Average Nearest Neighbour Degree(ANND), Node Strength, Average Nearest Neighbour Strength (ANNS), and Clustering Coefficient (CC) to To compare the degree of international trade and financial Integration. They found that Goods markets were more densely connected than financial ones. Both types of network display a disassortative, star shaped structure dominated by a handful of hubs. The hierarchical structure is more marked in financial than in real markets.

Carmen Fillat-Castejón, Joseph F. Francois, Julia Woerz (2008) used an analytical framework for studying cross-border and establishment modes (i.e. and trade and FDI) based on a model of joint delivery of services to explore the degree of complementarity between trade and FDI in services over both short and longer run time horizons. They inferred that Direct effect and the indirect complementarity from FDI towards services imports were both reinforced in the long run, while the evidence becomes weaker in the opposite direction. Also, the standard (uncontrolled) approach yields a significant complementarity from FDI towards cross-border trade.

To determine an comprehensive examination of regional and subregional FTA pairings, inclusive not only of tariffs, but also of trade facilitation and services liberalization, **Joseph F. Francois and Ganeshan Wignaraja (2008)** used Two stage regression analysis and found that he economies of South Asia already have trade patterns directed toward East Asia. Most of the East Asian gains from a South Asian initiative followed directly from Indian participation. The other players in the region had only a limited impact on East Asia.

Raja Kali and Javier Reyes(2007) used Global integration measures such as Centrality, Network density, Clustering, Degree Correlation and Assortative mixing local integration measures to determine an comprehensive examination of regional and subregional FTA pairings, inclusive not only of tariffs, but also of trade facilitation and services liberalization. They found that in terms of participation and influence in the network, global trade was hierarchical, with a core–periphery structure at higher levels of trade, though integration of smaller countries into the network increased considerably over the 1990s. The network is strongly 'balkanized' according to geography of trading partners, but not as strongly by income or legal origin. The researcher also found that a country's position in the network has substantial implications for economic growth.

M. Ángeles Serrano, Marián Boguñá, and Alessandro Vespignani (2007) used Weighted Complex Network Analysis, Probability Density Approach and Dollar Experiment to determine a quantitative study of the world trade network by implementing the trade flux analysis at a global scale. They found that Switzerland spent a large share of his trade imbalance in countries which do not have appreciable trade with it and were therefore not directly connected such as Japan, Indonesia, and Malaysia. A recurrent motif present in all years was the star-like structure, formed by a central powerful economy, which highlighted the USA, surrounded by small dependent economies. However, other countries have gradually lost this role in favour of others.

Suparna Karmakar (2007) used Descriptive approach based on existing literature and Simple linear Correlation to analyse the main features of the prevalent regulatory measures and associated market access barriers faced by developing country service providers, and to assess how, the proposed disciplines could help developing country members in securing or easing market access for their professional service providers in the developed country markets. The conclusions include a strong correlation between the level of development and regulatory procedures. Developing countries had weaker and inefficient regulatory regimes, and need capacity building to improve regulatory abilities and standards domestically.

Keith Walsh (2006) used Pooled OLS and Hausman, Taylor model (HTM) and Gravity Model (both Random Effects and Fixed Effects), Trade Restrictiveness Index (TRI) to analyse the determinants of trade in services, with special refence to role and measurement of barriers to services trade and also to

generate a series of quantified estimates of the barriers to services trade for a range of industrialised countries (primarily the OECD countries) and their main trading partners. The conclusions include GDP per capita of the importer and exporter and the presence of a common language were the most influential explanatory variables. The researcher also found that distance was not a significant determinant of services trade flows.

Tim Kastelle, John Steen and Peter Liesch(2006) used Complex systems Network analysis with longitudinal trade data from 1938 to 2003. The objective was to measure and analyse globalisation and to demonstrate some important aspects of the international trade network. The nature of the international trading network has changed in some important ways over the past 65 years. At the same time, the basic structure of the network appears to have been remarkably stable over this same period.

To develop a quantitative, open economy growth model in to establish whether service sector growth can be accounted for by the increase in service sector trade or due to high Total Factor Productivity (TFP) growth in the service sector, **Rubina Verma (2006)** used Social Accounting Matrix (SAM) and adoption of Counter Factual Experiments. The model captured the direction of the falling capital share in agriculture. The model also predicted an almost unchanging capital output ratio over time though the data shows this ratio to be falling.

Arpita Mukherjee (2005) used Descriptive Approach with the help of existing literature and data. The objective of this paper is to present the concerns and prospects for developing countries in the GATS negotiations with specific reference to India. Developing countries such as India had a major stake in the negotiations since service sector accounts for a substantial part of their GDP and was a growing component of their trade. These countries have also created a niche for themselves in particular services exports.

Rashmi Banga (2005) descriptively reviewed existing literature and concluded with the need to develop a separate theory for trade in services, as distinct from theories that exist for trade in goods. The paper also provided policy insights and future areas of research in trade in service.

To determine a directed version of world trade web, and further explore dynamics of GDP in the system,

Diego Garlaschelli and Maria I. Loffredo (2004) used Directed network structure expected using clustering coefficient and Average Nearest Neighbours Degree (ANND) and found that Tendency of low degree countries to trade with tightly interacting partners, and higher-degree countries to trade with more loosely interacting partners was majorly found.

Another research paper of **Diego Garlaschelli and Maria I. Loffredo (2004) used** Fitness Model

Which measures potential ability of being connected to other vertices to justify the relevance of hidden variables in reproducing relevant topological properties of World Trade Web (WTW). The result concluded supporting the significant role of hidden variable for obtaining all the possible properties of the world trade web.

Ma A´ ngeles and Serrano,Maria´n Bogun˜a (2003) used Network density indicators such as Average Nearest Neighbours Degree (ANND) and degree-degree correlation to present an empirical characterisation of the world trade network. The World Trade Web showed right-skewed node degree distribution. The structure can be said as clustered. The research also found out the trade network is reciprocal with a high fraction of bidirectional connections

Sangmoon Kim and Em-Hang Shin (2002) used Construction of dichotomized directional matrices of international trade of selected countries to analyse orientation of global integration through SNA approach and to examine consequences of the same. Cohesiveness and interdependency between 1959 and 1996 have been found in World trade network. Geodesic distance has decreased since 1959. the increases in mean number of ties and density and the decrease in geodesic distance are faster between 1959 and 1975 than between 1975 and 1996.

Edward L. Kick and Byron L. Davis (2001) used OLS Regression Analysis of 11 established blocks, with respect to 10 dummy variables and per capita GDP to give an empirical presentation of multiple network analyses of world trade. The paper showed overall consistency in world trade system for selected period. Results also showed significant wealth gaps between core, semi-core, semi-periphery and periphery.

To examine RCA in trade in services of selected countries and further find out potential exports competitiveness for India, **Shobha Ahuja (1993)** used Revealed Comparative Advantage Index,

where, India has been able to display "potential" comparative advantage in the high growth service areas. India shows potential strength even after liberalising service trades.

III. Research Gap

- Various studies have been highlighting dimensions of connectivity of global integration by using Social Network Analysis (SNA) approach [12-18]. The existing literature considers only merchandise or goods trade and generalised the result to aggregate trade.
- The literature is not that abundant when we do not consider merchandise trade as whole of trade. The research gap arises when we look for services trade network structure instead of assuming goods trade as total trade performance. After studying various highlights about World Trade Network (WTN) and wide usage of glossy inferences, it cannot be ignored the fact that the existing literature does not consider service trade while saying anything about WTN.

IV. Need of the study

- Service trade has not only a huge contribution in international trade, but can also impact on various dimensions of connectivity. But it is a matter of investigation with due evidences.
- Hence, the researcher considers it as the urgency and wants to trace the network structure of India's foreign trade with respect to aggregate service and category specific services. The study, to the researcher's best knowledge, would be the first empirical characterisation of India's foreign service trade network analysis. Further, strength of association will also be calculated between per capita GDP and major density indicator with respect to foreign service trade of India.

V. Social Relevance of the Study

- World Trade Report,2020 reported that distribution services and financial services are the largest traded services globally, with US$ 2,634 billion and US$ 2,463 billion respectively, and they account for 19.9 per cent and 18.6 per cent of total services trade in 2017. The financial sector is the backbone of the economy, and one of its key functions is to enable international transactions, facilitating the smooth exchange of goods and services between countries, while managing the risks associated with their flows. The distribution sector, where the key players are wholesalers and retailers, has a crucial role in international trade. This sector connects producers and

consumers globally, and ultimately ensures consumers' access to a variety of goods at competitive prices.

- Similar trend can be seen in India's service export context, where the share of exports of miscellaneous services (or other commercial services (OCS))- software, business, financial and communication services- has grown significantly over past three decades and more so in the past decade (16). The growth in IT enabled services can be due to the growth in India's exports of business process outsourcing (BPO) activities. Availability of an English speaking, techno-savvy and cost-effective workforce has helped India gain an edge in this sector. In India, the manpower cost is almost one-tenth of the developed countries. India's time zone with an 8 to 12 hours' time difference with respect to the overseas markets like the US enables India to offer round-the-clock services to its clients. Indian companies are able to work in a shift system which helps in better utilisation of resources (15)
- Thus, this study will not only help the policymakers, but also will reflect the future potential for India's foreign service trade connectivity. Leading to give an idea of the employment dependent on above mentioned foreign service trade sector and As, the connection among countries shows to what extent different countries are connected with each other, it also reflects the connection among the society of these countries.

VI. Research Objectives

1. To find out topological dimensions of connectivity of India's International Service Trade Network while tracing the network structure of International Service Trade of selected countries with respect to the existing Trade Network Theory.

2. To find out nature and direction of Density and Centralisation of India's International service trade network structure and Annual Aggregate GDP.

3. To find out nature, direction and Causation between Annual Aggregate GDP and India's International service trade Node's Strength.

4. To find out potential areas to strengthen future International Service Trade.

VII. Proposed Hypotheses:

H_{01} : There is no significant relationship between Density of a country node and its GDP

H_{02} : There is no significant relationship between Centralisation of a country and its GDP

H_{03} : There is no significant relationship between Node's strength of a country and its GDP

Basic Technical Parameters of Network Structure:

Nodes: Nodes are the units or actors in a network structure. In this study, nodes will be the countries whose topological properties will be studied.

Density: Network Density is defined as the share of existing to maximum possible links in the binary N X N matrix.

Strength: It measures the total weight of connections for nodes, which provides an assessment of the intensity of its interaction within the network; in-strength and out-strength sum the weight of incoming and outgoing edges, respectively.

Degree: It refers to the number of edges connected to a node. In directed graphs in-degree and out-degree quantify the number of incoming and outgoing edges, respectively.

Centrality: It is the measurement of the position of each node with respect to the whole network or its neighbourhood.

Betweenness: Betweenness is the measure of the extent to which a node is connected to other nodes that are not connected to each other. It is a measure of the degree to which a node serves as a bridge.

Mean geodesic distance: It can be understood as the shortest path in terms of number of edges among the nodes.

VIII.Research Methodology

Table 1 : Showing objective wise research methodology

Objectives	**Research Methods**
1.To find out topological dimensions of connectivity of India's International Service Trade Network while tracing the network structure of International Service Trade of selected countries with respect to the existing Trade Network theory.	The objective will be fulfilled through two stages. Firstly, International Service Trade Network Structure of selected countries will be traced and then the following basic dimensions of connectivity of India's International Service Trade Node will be evaluated: • Degree • Strength • Density • Clustering Coefficient And other dimensions as and when required

2. To find out nature and direction of Density and Centralisation of India's International Service Trade network structure and Annual Aggregate GDP.	Firstly, Density and Centralisation of India's aggregate International service trade node will be calculated. Then, Simple linear correlation will be calculated between Density and Centralisation of India's aggregate international service trade node and Annual Aggregate GDP.
3. To find out nature, Direction and Causation between Annual Aggregate GDP and India's International Service Trade Node's Strength.	Firstly, Strength of India's aggregate international service trade node will be calculated. Then, Simple linear correlation will be calculated between Strength of India's aggregate international service trade node and Annual Aggregate GDP. Causation Analysis will also be executed between the tw stated variables.
4. To find out potential areas to strengthen future International Service Trade.	Analysis on the basis of above accomplished objectives.

Research Design

Table 2 : Showing details of Research Design

Type of Data	The researcher will use Secondary Data.
Period of Data	from financial year 2010 to financial year 2022 (as relevant data before 2010 is not available for all the selected countries)
Sample Size	30 Countries of WTO (selected on the basis of relevant data and maximum service trade volume during last 3 years) and India List of countries taken as sample : (30 countries and India) United States United Kingdom Singapore Germany Hong Kong, China China (People's Republic of) UAE Switzerland Netherlands Japan Australia Korea France Saudi Arabia Ireland Canada Sweden Thailand Italy

	Chinese Taipei Spain Indonesia Brazil Bangladesh Belgium Malaysia Israel Denmark South Africa Mexico
Data Sources	The researcher will be approaching Journals, WTO Annual Reports, WTO & IMF Working Papers, Books and Official websites of WTO, OECD, WITS, IMF and Government of India.
Statistical Tools to be used	Simple Linear Correlation, Regression Analysis, Causality Analysis, Pattern Analysis of Trade Network, t-test

Proposed Chapter Plan

Chapter 1: Introduction

Chapter 2: Review of Literature

Chapter 3: India's Service Trade Network Structure: A Web well knitted

Chapter 4: Nature and Direction of Density and Annual Aggregate GDP

Chapter 5: Nature, Direction and Causation between strength of Node and Annual Aggregate GDP

Chapter 6: Suggestions to strengthen future International Service Trade

Chapter 7: Conclusion

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